BULLETIN

OF

THE JOHNS HOPKINS HOSPITAL.

Vol. V.—No. 42.] BALTIMORE, OCTOBER, 1894. [Price, 15 Cents.

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OLIVER WENDELL HOLMES.*

By Wm. Osler, M. D.

Very fitting indeed is it that he who had lived to be "the last leaf upon the tree" should have fallen peacefully in the autumn which he loved so well. Delightful, too, to think that although he had, to use the expression of Benjamin Franklin, intruded himself these many years into the company of posterity, the freshness and pliancy of his mind had not for a moment failed. Like his own wonderful "one-hoss shay," the end was a sudden breakdown; and though he would have confessed, no doubt, to "a general flavor of decay" there was nothing local, and his friends had been spared that most distressing of all human spectacles, those cold gradations of decay, in which a man takes nearly as long to die as he does to grow up, and lives a sort of death in life, "*ita sine vita vivere, ita sine morte mori.*"

Enough has been said, and doubtless well said, by those who make criticism their vocation, upon the literary position and affinities of Oliver Wendell Holmes, and I shall spare your perhaps already surcharged ears. He has been sandwiched in my affections these many years between Oliver Goldsmith and Charles Lamb. More than once he has been called, I think, the American Goldsmith. Certainly the great distinction of both men lies in that robust humanity which has a smile for the foibles and a tear for the sorrows of their fellow-creatures. The English Oliver, with a better schooling for a poet (had he not learned in suffering what he taught in song?), had a finer fancy and at his best a clearer note. With both writers one is at a loss to know which to love the better, the prose or the poetry. Can we name two other prose-writers of equal merit, who have so successfully courted the "draggle-tailed Muses," as Goldsmith calls them? Like Charles Lamb, Holmes gains the affections of his readers at the first sitting, and the genial humor, the refined wit, the pathos, the tender sensitiveness to the lights and shadows of life, give to the Breakfast Table Series much of the charm of the Essays of Elia.

While it is true that since Rabelais and Linacre no generation has lacked a physician to stand unabashed in the temple at Delos, a worshipper of worth and merit amid the votaries of Apollo, I can recall no name in the past three centuries eminent in literature—eminent, I mean, in the sense in which we regard Goldsmith—which is associated in any enduring way with work done in the science and art of medicine. Many physicians, active practitioners—Sir Thomas Browne, for example—have been and are known for the richness and variety of their literary work; but, as a rule, those who have remained in professional life have courted the "draggle-tailed Muses" as a gentle pastime, "to interpose a little ease" amid the worries of practice. Few such have risen above mediocrity; fewer still have reached it. We know the names of Garth, of

*Remarks made at the Johns Hopkins Medical Society, October 15, 1894.

Arbuthnot and of Akenside, but we neither know them nor their works. The list is a long one, for the rites of Apollo have always had a keen attraction for the men of our ranks, but the names fill at the best a place in the story of the literature of the country, not a place in the hearts and lives of the people. Far otherwise is it with a select group of men, Goldsmith, Crabbe and Keats, at the outset members of our profession, but who early broke away from its drudgery. In pride we claim them, though in reality no influence of their special studies is to be found in their writings. Two of these, at least, reached the pure empyrean, and to use Shelley's words, robed in dazzling immortality, sit on thrones

> "built beyond mortal thought,
> Far in the Unapparent."

Oliver Wendell Holmes may not reach the same exalted sphere, but he will always occupy a unique position in the affections of medical men. Not a practitioner, yet he retained for the greater part of his active life the most intimate connection with the profession, and as Professor of Anatomy at Harvard University, kept in touch with it for nearly forty years. The festivals at Epidaurus were never neglected by him, and as the most successful combination which the world has ever seen of the physician and the man of letters, he has for years sat amid the Esculapians in the seat of honor.

During the nineteenth century three schools in succession have moulded the thoughts and opinions of the medical profession in this country. In the early period English ways and methods prevailed, and (as in the colonial days) the students who crossed the Atlantic for further study went to Edinburgh or to London. Then came a time between 1825 and 1860 when American students went chiefly to Paris, and the profession of the country was strongly swayed by the teaching of the French school. Since 1860 the influence of German medicine has been all-powerful, but of late American students are beginning to learn that their "wanderjahren" should be truly such, and that when possible they should round out their studies in France and England.

In the thirties a very remarkable body of young Americans studied in Paris, chiefly under the great Louis—Oliver Wendell Holmes, James Jackson, Jr., Henry I. Bowditch and George C. Shattuck, from Boston, Swett, from New York, Gerhard and Stillé, from Philadelphia, and Power, from Baltimore. They brought back to this country scientific methods of work and habits of accurate, systematic observation, and they had caught also, what was much more valuable, some of his inspiring enthusiam. So far as I know, one alone of Louis's American pupils remains, full of years and honors—Prof. Stillé, of the University of Pennsylvania.

More than once in his writings Holmes refers to his delightful student days in France, and the valedictory lecture to his class in 1882 is largely made up of reminiscences of his old Paris teachers.

The fulness of Holmes's professional equipment is very evident in his first contributions to medicine. In the years 1836 and 1837 we find him successfully competing for the Boylston prizes, with essays on Intermittent Fever in New England, on Neuralgia, and on the Utility and Improvement of Direct Exploration in Medical Practice. Of these the essay on intermittent fever is in many ways the most important, since it contains a very thorough review of the testimony of the early New England writers on the subject, for which purpose he made a careful and thorough examination of the records of the first century of the settlements. Here and there throughout the essay there is evidence of his irrepressible humor. Referring to the old writers, he says, that because indexes are sometimes imperfect, he has looked over all the works page by page, with the exception of some few ecclesiastical papers, sermons and similar treatises of Cotton Mather, "which, being more likely to cause a fever than to mention one, I left to some future investigator." The essay shows great industry, and is of value to-day in showing the localities in which malaria prevailed in the early part of this century, and at the time at which he wrote. The essay on neuralgia is not so interesting, but is an exhaustive summary of the knowledge of the disease in the year 1836. The third dissertation, on direct exploration, of much greater merit, is a plea for the more extended use of auscultation and percussion in exact diagnosis. The slowness with which these two great advances were adopted by our fathers contrasts in a striking manner with the readiness with which at the present day we take up with new improvements and appliances. Avenbrugger's work on percussion dates from 1761, but it was not until the beginning of this century that the art of percussion was revived by Corvisart and Laennec; while Piorry, as Holmes says, succeeded in creating himself a European reputation by a slight but useful modification in the art, referring to his pleximeter, of which in another place he says that Piorry "makes a graven image." The great discoveries of Laennec make their way very slowly to general adoption, and to this Holmes refers when he says, "it is perfectly natural that they (speaking of the older practitioners) should look with suspicion upon this introduction of medical machinery among the old, hard-working operatives; that they should for a while smile at its pretensions, and when its use began to creep in among them, that they should observe and signalize all the errors and defects which happened in its practical application."

Gerhard's work on the diagnosis of diseases of the chest was published in 1836, and with this essay of Holmes's opened to the American profession the rich experience of the French school in the methods of direct exploration in all disorders of the chest and of the heart. Holmes's essay may be read to-day by the student with great profit; it is particularly rich in original references to the older writers. Readers of the *Autocrat* and of others of Holmes's literary works have been surprised at the readiness with which he quotes and refers to the fathers of the profession, a facility readily explained by these Boylston prize dissertations; and in their preparation he had evidently studied not only the modern authors of the day, but he had gone in the original to the great masters from Hippocrates to Harvey.

The prize essay does not constitute the most enduring form of medical literature, and though the dissertation on Malaria is in some respects one of the very best of the long series of Boylston essays, yet we could scarcely have spoken of a medical

reputation for Dr. Holmes had it to rest upon these earlier productions. A few years later, however, he contributed an article which will long keep his memory green in our ranks.

Child-bed fever was unhappily no new disorder when Oliver Wendell Holmes studied, nor had there been wanting men who had proclaimed forcibly its specific character and its highly contagious nature. Indeed, so far back as 1795, Gordon, of Aberdeen, not only called it a specific contagion, but said he could predict with unerring accuracy the very doctors and nurses in whose practice the cases would develop. Rigby, too, had lent the weight of his authority in favor of the contagiousness, but the question was so far from settled that, as you will hear, many of the leading teachers scouted the idea that doctors and nurses could convey the disorder. Semmelweis had not then begun to make his interesting and conclusive observations, for which his memory has recently been so greatly honored.

In 1842, before the Boston Society for Medical Improvement, Dr. Holmes read a paper entitled "The Contagiousness of Puerperal Fever," in which he brought forward a long array of facts in support of the view that the disease was contagious, conveyed usually by the doctor or the nurse, and due to a specific infection. At the time there certainly was not an article in which the subject was presented in so logical and so convincing manner. As Sidney Smith says, it is not the man who first says a thing, but it is he who says it so long, so loudly and so clearly that he compels men to hear him—it is to him that the credit belongs; and so far as this country is concerned, the credit of insisting upon the great practical truth of the contagiousness of puerperal fever belongs to Dr. Holmes. The essay is characterized in places by intenseness and great strength of feeling. He says he could not for a moment consent to make a *question* of the momentous fact which should not be considered a subject for trivial discussion, but which should be acted upon with silent promptitude. "No negative facts, no passing opinions, be they what they may or whose they may, can form any answer to the series of cases now within the reach of all who choose to explore the records of medical science." Just before the conclusions the following eloquent paragraphs are found, portions of which are often quoted:—"It is as a lesson rather than as a reproach that I call up the memory of these irreparable errors and wrongs. No tongue can tell the heart-breaking calamities they have caused; they have closed the eyes just opened upon a new world of life and happiness; they have bowed the strength of manhood into the dust; they have cast the helplessness of infancy into the stranger's arms, or bequeathed it with less cruelty the death of its dying parent. There is no tone deep enough for record, and no voice loud enough for warning. The woman about to become a mother, or with her new-born infant upon her bosom, should be the object of trembling care and sympathy wherever she bears her tender burden, or stretches her aching limbs. The very outcast of the street has pity upon her sister in degradation when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law brought down upon its victims by a machinery as sure as destiny, is arrested in its fall at a word which reveals her transient claims for mercy. The solemn prayer of the liturgy singles out her sorrows from the multiplied trials of life, to plead for her in the hour of peril. God forbid that any member of the profession to which she trusts her life, doubly precious at that eventful period, should regard it negligently, unadvisedly, or selfishly."

The results of his studies are summed up in a series of eight conclusions, and the strong ground which he took may be gathered from this sentence in the last one: "The time has come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune but a crime." Fortunately this essay, which was published in the ephemeral New England Quarterly Journal of Medicine, was not destined to remain unnoticed. The statements were too bold and the whole tone too resolute not to arouse the antagonism of those whose teachings had been for years diametrically opposed to the contagiousness of puerperal fever. Philadelphia was the centre of the teaching and work in obstetrics in this country, and if we can speak at all of an American school of obstetricians it is due to the energy of the professors of this branch in that city, and for the sake of the memory of the men we could wish expunged the incident to which I will now allude.

In 1852 the elder Hodge, Professor of Obstetrics at the University of Pennsylvania, published an essay on the non-contagious character of puerperal fever, and in 1854 Charles D. Meigs, Professor of Obstetrics at the Jefferson Medical College, published a work on the nature, signs, and treatment of child-bed fevers, in a series of letters addressed to students of his class. Both of these men, the most distinguished professors of obstetrics in America, took extreme ground against Holmes, and Meigs handled him rather roughly.

Nothing daunted, in the following year (1855) Holmes reprinted the essay, calling it *Puerperal Fever as a Private Pestilence*. He clearly appreciated the character of the work he was doing, since in the introduction he says, "I do not know that I shall ever again have so good an opportunity of being useful as was granted to me by the raising of the question which produced this essay." The point at issue is squarely put in a few paragraphs on one of the first pages; the affirmative in a quotation from his essay: "The disease known as puerperal fever is so far contagious as to be carried from patient to patient by physicians and nurses" (1843). The negative in two quotations, one from Hodge (1852), who "begged his students to divest their minds of the dread that they could ever carry the horrible virus"; and of Meigs (1854), who says, "I prefer to attribute them (namely, the deaths) to accident or Providence, of which I can form a conception, rather than to a contagion of which I cannot form any clear idea."

The introduction to the essay, which was reprinted as it appeared in 1842, is one of the ablest and most trenchant pieces of writing with which I am acquainted. There are several striking paragraphs; thus, in alluding to the strong and personal language used by Meigs, Holmes says: "I take no offence and attempt no retort; no man makes a quarrel with me over the counterpane that covers a mother with her new-born infant at her breast." He appeals to the medical student not to be deceived by the statements of the two distinguished

professors which seem to him to encourage professional homicide. One paragraph has become classical: "They naturally have faith in their instructors, turning to them for truth, and taking what they may choose to give them; babies in knowledge, not yet able to tell the breast from the bottle, pumping away for the milk of truth at all that offers, were it nothing better than a professor's shriveled forefinger."

The high estimate in which this work of Holmes' is held has frequently been referred to by writers on obstetrics.

Some years ago in an editorial note I commented upon a question which Dr. Holmes had asked in his "Hundred Days in Europe." Somewhere at dinner he had sat next to a successful gynæcologist who had saved some hundreds of lives by his operations, and he asked, "Which would give the most satisfaction to a thoroughly humane and unselfish being, of cultivated intelligence and lively sensibilities: to have written all the plays which Shakespeare has left as an inheritance for mankind, or to have snatched from the jaws of death more than a hundred fellow-creatures, and restored them to sound and comfortable existence?" I remarked that there was nobody who could answer this question so satisfactorily as the Autocrat, and asked from which he derived the greater satisfaction, the *essay on puerperal fever*, which had probably saved many more lives than any individual gynæcologist, or the *Chambered Nautilus*, which had given pleasure to so many thousands. The journal reached Dr. Holmes, and I read you his reply to me, under date of January 21st, 1889:

"I have rarely been more pleased than by your allusion to an old paper of mine. There was a time certainly in which I would have said that the best page of my record was that in which I had fought my battle for the poor poisoned women. I am reminded of that essay from time to time, but it was published in a periodical which died after one year's life, and therefore escaped the wider notice it would have found if printed in the American Journal of the Medical Sciences. A lecturer at one of the great London hospitals referred to it the other day and coupled it with some fine phrases about myself which made me blush, either with modesty or vanity, I forget which.

"I think I will not answer the question you put me. I think oftenest of the 'Chambered Nautilus,' which is a favorite poem of mine, though I wrote it myself. The essay only comes up at long intervals. The poem repeats itself in my memory, and is very often spoken of by my correspondents in terms of more than ordinary praise. I had a savage pleasure, I confess, in handling those two professors—learned men both of them, skillful experts, but babies, as it seemed to me, in their capacity of reasoning and arguing. But in writing the poem I was filled with a better feeling—the highest state of mental exaltation and the most crystalline clairvoyance, as it seemed to me, that had ever been granted to me—I mean that lucid vision of one's thought and all forms of expression which will be at once precise and musical, which is the poet's special gift, however large or small in amount or value. There is more selfish pleasure to be had out of the poem—perhaps a nobler satisfaction from the life-saving labor."

Last year at the dinner of the American Gynæcological Society in Philadelphia a letter from Dr. Holmes was read referring to the subject in very much the same language as he uses in his letter to me. One or two of the paragraphs I may quote. "Still I was attacked in my stronghold by the two leading professors of obstetrics in this country.

"I defended my position, with new facts and arguments, and not without rhetorical fervor, at which, after cooling down for half a century, I might smile if I did not remember how intensely and with what good reason my feelings were kindled into the heated atmosphere of superlatives.

"I have been long out of the way of discussing this class of subjects. I do not know what others have done since my efforts; I do know that others had cried out with all their might against the terrible evil, before I did, and I gave them full credit for it.

"But I think I shrieked my warning louder and longer than any of them, and I am pleased to remember that I took my ground on the existing evidence before the little army of microbes was marched up to support my position."

Fortunately, Dr. Holmes's medical essays are reprinted with his works. Several of them are enduring contributions to the questions with which they deal; all should be read carefully by every student of medicine. The essay on Homeopathy remains one of the most complete exposures of that therapeutic fad. There is no healthier or more stimulating writer to students and to young medical men. With an entire absence of nonsense, with rare humor and unfailing kindness, and with that delicacy of feeling characteristic of a member of the Brahmin class, he has permanently enriched the literature of the race.

Search the ranks of authors since Elia, whom in so many ways Holmes resembled, and to no one else could the beautiful tribute of Landor be transferred with the same sense of propriety:

> "He leaves behind him, freed from grief and fears,
> Far nobler things than tears,
> The love of friends without a single foe,
> Unequalled lot below."

THE JOHNS HOPKINS HOSPITAL REPORTS, VOL. IV, Nos. 1, 2 and 3.

REPORT ON TYPHOID FEVER.

By WM. OSLER, M. D., *Professor of Medicine, Johns Hopkins University, and Physician-in-Chief to the Johns Hopkins Hospital.*

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THE LEUCOCYTES IN MALARIAL FEVER.

By John S. Billings, Jr., *Assistant Resident Physician.*

The blood in malarial fever has of late years offered a rich field for investigation, and many have been the articles and reports upon the subject since the discovery of the malarial parasite. These investigations have, however, been limited almost entirely to the malarial organism and the changes it brings about in the red corpuscles. Little attention has been paid to the leucocytes, and the literature on this part of the subject is scanty. The work done has been confined chiefly to the pigmented leucocytes which occur in the blood in malarial fever—a question which does not concern us.

Rieder, in his work on the leucocytoses, refers briefly to the fact that Kelsch, Von Limbeck, Fahrmann and others have found no leucocytosis in malarial fever. Indeed, one or two of them state that the number of the leucocytes falls below normal.

Kelsch (Arch. de Physiol., 1875, p. 690, and 1870, p. 490) found the leucocytes diminished from one-third to one-half in malarial fever. He also states that at the beginning of the paroxysm there is a slight transient increase in the number of leucocytes in the blood. He found that the minimum number of the leucocytes corresponded to the maximum enlargement of the spleen, and that when the size of the spleen was diminished by means of an electrical current, there was a transient increase in the number of the leucocytes.

The most exhaustive article on the subject is that of Bastianelli (Bull. d. Real. Accad. Med. d. Roma, Ann. xviii, Fasic. v, p. 487). He occupies himself chiefly with the discussion of the pigmentation of leucocytes and phagocytosis. He refers to Golgi, who holds that phagocytosis occurs regularly as a function of the leucocytes, obtaining at definite phases of development of the organism. This phagocytosis is accomplished both by the polynuclear leucocytes and the large mononuclear and transitional forms, while the lymphocytes and eosinophiles never contain pigment. Golgi also believes that phagocytosis may account for the spontaneous recovery observed in so many cases, and that it plays an important part in the prevention of all malarial fevers from becoming pernicious.

Bastianelli finds:

1. The number of leucocytes is always diminished in malarial fever.

2. The number of pigmented leucocytes increases markedly at the time of sporulation of the organism in the tertian cases; *i. e.*, at the beginning of the febrile paroxysm.

3. In cases of spontaneous recovery no increase is to be observed in the number of pigmented leucocytes. This phenomenon of phagocytosis may occur at all stages of the cycle of evolution of the organism in the æstivo-autumnal cases.

4. The phagocytic leucocytes rapidly become necrotic and disappear from the blood. This probably accounts for the diminution in number of the leucocytes which takes place in malarial fever.

5. The phagocytosis is accomplished chiefly by the large mononuclear forms.

As regards the relative numerical proportions of the various forms of leucocytes, he only states that in post-malarial anæmia the percentage of the polynuclear elements decreases, while that of the lymphocytes and large mononuclear elements increases.

The observations here reported were undertaken with the view of determining, if possible, whether any regular variations took place in the number of leucocytes in the blood during the febrile and afebrile periods of malarial fever.

Malaria is very prevalent in the immediate neighborhood of Baltimore, and we see three types of fever, as follows:

1. The spring or tertian type. This is most common in the spring and early summer, though cases are often seen in the autumn. The paroxysms occur every other day if the case be one of single tertian, and daily if it be one of double tertian; *i. e.*, with two sets of organisms in the blood, maturing on alternate days. This latter form is the commonest type we see here.

2. The quartan type. This is rarely seen, there being only five cases on record in the hospital. The paroxysms are rarely as severe as those in the previously mentioned type of the disease. They may occur every third day, two out of every three days, or every day, according as there may be one, two or three sets of organisms in the blood.

3. The fall type. This is the æstivo-autumnal type of the Italian observers, and occurs in the late summer and fall. The course of the fever is irregular. There may be definite paroxysms, as in the tertian type of the disease, or the temperature may be continuously elevated for days. The paroxysms may occur daily, or there may be no regular periodicity.

The counts were made with the Thoma-Zeiss hæmocytometer, the same instrument being used in each case. Care was taken that the counts should not be made within two hours after meals. In about half the cases the large one to twenty mixer was used, with the one-third per cent acetic acid solution as a diluting medium. In the remainder the smaller one to one hundred mixer was used, with Toison's fluid as a diluent. The results obtained with the latter instrument seem fully as accurate as those with the former. Four whole fields were counted in each case.

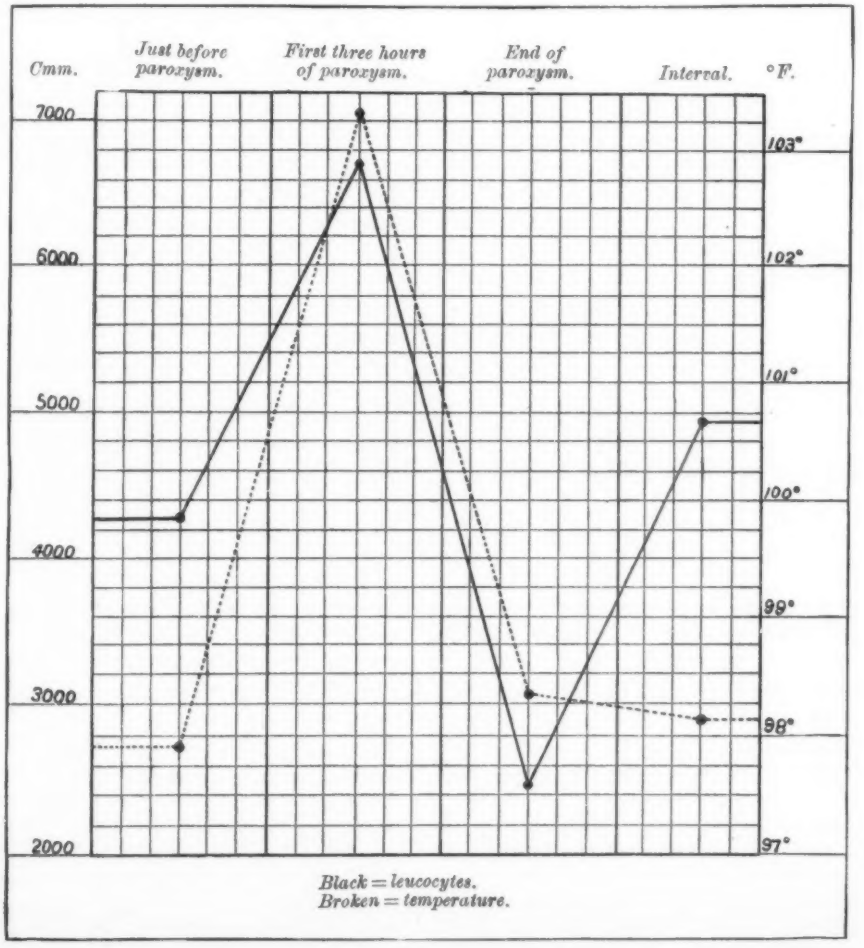
The relative numerical proportions of the various forms of leucocytes were estimated by means of dried and stained cover-glass preparations. These were hardened by heat according to Ehrlich's method, and stained with the Ehrlich-Biondi triple stain as modified by Thayer. The counting was done with a mechanical stage, and the number of leucocytes counted varied. In all cases at least two hundred and fifty were counted, and in one or two as many as one thousand. The nomenclature used is according to Thayer, which is a modification of those used by Ehrlich and Uskow. The lymphocytes and small mononuclear forms of Ehrlich are given together under the head of small mononuclears, while the large mononuclear and transitional forms are classified together as large mononuclears. It is difficult to draw any hard and

fast line between these two groups. Any mononuclear element one and one-half times as large as a red blood corpuscle was counted as a large mononuclear. According to this rule a large lymphocyte would be occasionally classified among the large mononuclears, while on the other hand the small transparent forms of Uskow would be counted among the small mononuclears. The difference was never more than one per cent, however.

The cases have been tabulated for convenience sake, and as little superfluous matter added as possible.

In looking over the table of tertian cases it is striking to note the uniform diminution in number of the leucocytes during the febrile paroxysm [leucocytolysis?]. It is also to be noted that the maximum number of leucocytes is found as a rule two or three hours after the chill. From that time on there is a progressive diminution until the minimum number of leucocytes is reached at the end of the paroxysm when the temperature is subnormal, which it usually is for some hours. The number of leucocytes then rises somewhat, and during the interval occupies a position about midway between the maximum and minimum above mentioned. The increase at the beginning of the paroxysm does not take place until after the chill, as the average number of leucocytes just before the chill is very slightly higher than the average number during the interval. These points are well shown if the average number of leucocytes at the different stages of the paroxysm be represented graphically together with the average temperature at those times.

The strong objection to the occurrence of this apparently regular oscillation of the number of leucocytes is the fact that the differences involved are so extremely small as to almost come within the limit of error of the hæmocytometer. This may be placed at two thousand at the outside, if sufficient care be taken. While we may be in doubt as to the occurrence of an increase in the number of leucocytes in the blood at the beginning of the malarial paroxysm, there can be little doubt that there is a definite diminution in the number of the leucocytes toward the end of the paroxysm. The difference between the average maximum and the average minimum number of leucocytes is 4271, which is well outside of the limit of error. The average number of leucocytes three hours after the beginning of the paroxysm is only 2300 more than the average number just before the beginning of the paroxysm. Yet this increase, slight as it may be, occurs in seven of our ten cases,



No.	Patient.	Date Admitted. — Previous Duration.	Type of Organism.	Date.	Hour.	Temperature.	Leucocytes per cmm.	Remarks.	Per cent. Polynuclears.	Per cent. small Mononuclears.	Per cent. large Mononuclears.	Per cent. Eosinophiles.
1.	K.—Male, 26. White.	August 18, 1893. Illness began August 16, 1893. Daily paroxysms.	Tertian (double).	Aug. 18.	1 P. M.	104.2°	3250	Beginning of chill.	68.2	15.1	15.6	1.1
					4 P. M.	103.6°	6000	.....	73.2	11.9	14.1	.8
					6 P. M.	101.6°	4100	.....	62.4	15.2	20.3	2.1
					12 mid.	97.8°	2000	.....	54.7	20.5	23.8	1.
2.	M.—Male, 33. White.	August 16, 1893. Illness began August 11, 1893. Daily paroxysms.	Tertian (double).	Aug. 19.	1.45 P. M.	101°	5500	Beginning of chill.	71.3	17.4	11.1	.2
				Aug. 20.	10 A. M.	97.2°	4500	.....	68.	7.3	24.2	.5
					10 P. M.	103°	2666	Chill began at 2 P. M.	52.7	12.8	33.2	1.3
				Aug. 21.	9 A. M.	97°	2500		49.8	18.6	30.9	.7
3.	S.—Male, 17. White.	August 21, 1893. Illness began August 14, 1894. Paroxysms every other day.	Tertian (single).	Aug. 23.	9 A. M.	100.2°	6000	Beginning of chill.	82.1	12.1	5.1	.7
					10 A. M.	103.6°	7750	.....	..	..	..	..
					11 A. M.	103.2°	7500	.....	75.8	7.1	16.	1.1
					12 M.	102.6°	4750	Sweating.	..	..	..	..
					1 P. M.	100.1°	5000	.....	..	..	..	..
					4 P. M.	99°	3500	.....	66.	22.4	10.6	1.
				Aug. 24.	12 M.	98°	3750	.....	65.1	23.7	9.2	2.
4.	Same case.	.....	.....	Aug. 25.	8 A. M.	102°	7250	Beginning of chill.	78.1	12.4	7.4	2.1
					10 A. M.	104.8°	9750	.....	79.2	8.1	12.4	.3
					12 M.	102°	6250	Sweating.	70 8	15.1	13.7	.4
					2 P. M.	100°	6000	.....	64.	13.5	21.5	1.
					4 P. M.	98.6°	5250	.....	..	..	..	..
					8 P. M.	98.6°	5000	.....	63 2	22.	8.8	6.
5.	S.—Male, 20. White.	August 24, 1893. Illness began August 10, 1893. Daily paroxysms.	Tertian (double).	Aug. 24.	8 P. M.	98.6°	3000		63.1	21.8	14.	1.1
					11 P. M.	105°	2250	Beginning of chill.	75.2	14.	10.2	.6
					12 P. M.	105°	3000	.....	..	..	..	..
				Aug. 25.	1 A. M.	104.9°	4200	.....	..	..	..	..
					2 A. M.	104.7°	6750	.....	74.6	7.5	17.4	.5
					3 A. M.	103.9°	4500	Sweating.	..	..	..	..
					4 A. M.	103.2°	3250	.....	..	..	..	..
					5 A. M.	102.4°	3500	.....	66.8	17.	16.	.2
					6 A. M.	101.1°	3000	.....	..	..	..	..
					8 A. M.	98.4°	2000	.....	70.2°	20.6	7.	.2
6.	B.—Male, 20. White.	August 25, 1893. Illness began August 20, 1893. Daily paroxysms.	Tertian (double).	Aug. 26.	8 A. M.	98°	6000	Just before chill.	66.9	22.1	10.2	.8
					2 P. M.	105°	8250	.....	71.	13 8	14.1	1.1
					6 P. M.	99°	4100	Sweating.	61.3	15.7	22.6	.4
				Aug. 27.	8 A. M.	98.6°	2000	.....	50.4	20.4	29.2	.0
7.	P.—Male, 19. White.	August 28, 1893. Illness began August 25, 1893. Daily paroxysms.	Tertian (double).	Aug. 29.	10 P. M.	97.8°	5000	Just before chill.	70.6	14.5	13.8	1 1
					12 P. M.	104.2°	6666	.....	81 6	6.4	11.1	.9
				Aug. 30.	12 M.	97°	2100	.....	61.4	17.4	19.2	2.
8.	W.—Male, 27. White.	March 6, 1894. Illness began March 4, 1894. Daily paroxysms.	Tertian (double).	March 6.	1.15 P. M.	103°	5000	Beginning of chill.	73.2	8.	18.8	.0
					4.15 P. M.	105°	6250	.....	80.2	6.9	12.6	.3
				March 7.	8.30 A. M.	97.9°	1500	.....	43.2	26.	30.4	.4
				March 8.	9 A. M.	98°	3100	.....	48.8	27.2	13.	2.
				March 9.	11 A. M.	98.6°	5750	.....	60.8	30.1	8.9	.2
				March 10.	11.30 A. M.	98.6°	5200	.....	74.1	20.9	4.2	.8
9.	G.—Male, 22. White.	August 14, 1894. Illness began August 9, 1894. Daily paroxysms.	Tertian (double).	Aug. 15.	3.30 P. M.	100°	3500	Beginning of chill.	73.8	13.	12.1	1.1
					10 P. M.	101°	1500	.....	64.1	14.1	21.	.8
				Aug. 16.	8 A. M.	98°	5000	.....	55.2	21.3	23.3	.2
					2.30 P. M.	98°	3000	Just before chill.	51.6	25.2	19.1	4.1
10.	J.—Male, 48. Black.	August 14, 1894. Illness began August 6, 1894. Daily paroxysms.	Tertian (double).	Aug. 16.	12 M.	98.6°	5100	.....	50.2	28.7	20.	1.1
				Aug. 17.	2 P. M.	101°	7000	Beginning of chill.	81.5	8.	10.	.5
					5.30 P. M.	100.6°	5750	Sweating.	72.8	9.1	17.1	1.
					10 P. M.	98°	2000	.....	58.	13.5	28.	.5
11.	B.—Female, 13. White.	August 24, 1893. Illness began August 14, 1893. Irregular fever since that date.	Æstivo-autumnal.	Aug. 27.	8 P. M.	103.2°	4500	Temperature not normal since admission.	62.8	27.6	9.6	.0
				Aug. 28.	8 P. M.	101.7°	2200		69.9	20.4	9.5	.2
				Aug. 30.	8 P. M.	98.2°	3500	First normal temperature.	63.1	7.1	29.6	.2
12.	T.—Male, 8. White.	September 2, 1893. Illness began August 12, 1893. Irregular fever since that date.	Æstivo-autumnal.	Sept. 3.	10 A. M.	99.8°	6100	Irregular fever temp. not touching normal for 3 days, i. e., until the 5th.	54.1	22.	22.1	.1
					6 P. M.	102°	4200		69.2	18.	11.3	1.5
				Sept. 4.	4 P. M.	104.6°	5200		48.1	20.2	31.3	.4
				Sept. 5.	8 A. M.	99.2°	6500		65.5	19.9	13.6	1.
13.	C.—Male, 30. Black.	September 11, 1893. Illness began September 6, 1893. Irregular fever with night sweats.	Æstivo-autumnal.	Sept. 11.	4 P. M.	105°	6400	Height of febrile paroxysm lasting 24 hours.	72.1	16.7	11.2	.0
				Sept. 12.	8 A. M.	98.8°	3500		70.6	12.4	13.9	3.1
					6 P. M.	98.6°	4000		68.7	12.7	18.1	.5
14.	C.—Male, 27. White.	September 16, 1893. Illness began August 7, 1893. Irregular febrile paroxysms with sweating.	Æstivo-autumnal.	Sept. 17.	8 A. M.	98.6°	2100		65.3	12.7	20.6	1.4
					8 P. M.	101.4°	2500	Height of paroxysm lasting 20 hours.	68.7	18.6	12.1	.6
				Sept. 18.	12 M.	98.6°	3400		59.	24.7	16.1	.2
15.	M.—Male, 26. White.	August 16, 1894. Illness began August 12, 1894. Irregular febrile paroxysms with chills and sweating.	Æstivo-autumnal.	Aug. 16.	3.30 P. M.	101°	5150	Temp. falling.	69.6	13.1	16.2	1.1
				Aug. 17.	10 A. M.	99°	6750	Temp. began to rise at 2 P. M.	52.5	23.5	23.	1.
					5 P. M.	100.7°	4200		45.1	23.7	30.	1.2
16.	K.—Male, 12. White.	July 19, 1894. Previous history not obtainable.	Quartan.	July 21.	8 A. M.	98.4°	5500		59.1	24.9	15.7	.3
					8 P. M.	100.5°	5100	Height of slight paroxysm.	61.3	17.8	18.3	2.6
				July 22.	8 A. M.	98.6°	5200		66.	17.2	16.1	.7

and until proof to the contrary be offered, we are justified in thinking it to take place regularly. The relative numerical proportion of the various forms of leucocytes is stated by Ehrlich to be as follows:

Polynuclears, 70 to 75 per cent; lymphocytes, 15 to 25 per cent; mononuclear and transitional forms, 6 per cent, and eosinophiles, 1 to 5 per cent.

Uskow gives it as follows: Lymphocytes and small mononuclears, 18 per cent; transparent and transitional forms, 6 per cent, and polynuclears and eosinophiles, 76 per cent. The two classifications practically correspond, and we will adopt the latter as our standard.

Taking up first the polynuclear leucocytes, it is seen that they are markedly diminished, both relatively and absolutely. In one case (No. 8) they are as low as 43.2 per cent. The greatest reduction is, as a rule, at the end of the paroxysm. In six cases there is a distinct increase in their number during the first three hours of the paroxysm, corresponding to the increase in number of the leucocytes as a whole. The small mononuclear elements vary widely, from 30.1 per cent in Case 8 to 6.4 per cent in Case 7. Nothing definite is to be made out concerning the variations in their percentage.

The large mononuclear elements are, as a rule, greatly increased, both absolutely and relatively. The highest count is 33.2 per cent in Case 2; the lowest, 4.2 per cent in Case 8. They are above normal in all but two instances, and seem to reach their maximum towards the end of the paroxysm, thus counterbalancing the polynuclear forms, which reach their minimum at that time. The percentage of eosinophiles is rather below normal, but nothing worthy of note is to be made out concerning them.

In the cases of malaria of the fall type it is impossible to arrive at as definite conclusions as in the tertian cases. The onset of the paroxysm is almost always gradual, the temperature rising and falling relatively slowly as compared to the temperature in the tertian cases. The paroxysms average about 36 hours in length. It seems, however, from our cases that there is a distinct though slight diminution in number of the leucocytes at the end of the paroxysm, the reparation in number of the leucocytes taking place during the interval. The polynuclear elements are distinctly decreased in number, while there is a corresponding increase in the number of the large mononuclear elements. The small mononuclears and the eosinophiles seem relatively unaffected.

In the one case of quartan malaria which came under observation, no variations in number of the leucocytes could be made out. The differential count of the leucocytes, however, showed the same condition of affairs already noted in the tertian and fall cases.

Besides the observations here reported, a sufficient number of extra counts were made to bring the total number of counts up to one hundred, the average result being 4323. So that if we take 7000 per cmm. as the average normal number of leucocytes in human blood, in malarial fever there is on an average a diminution of about 38 per cent.

This is possibly to be explained as Bastianelli says, by the necrosis of the phagocytic leucocytes which have taken up altered blood pigment, malarial organisms and degenerated red blood corpuscles. At any rate the diminution in number of the leucocytes does occur, whatever may be the cause.

The average numerical proportions of the various forms of leucocytes in the 16 cases are as follows:

Polynuclears.	Small Mononuclears.	Large Mononuclears.	Eosinophiles.
65.04 per ct.	16.9 per cent.	16.9 per cent.	0.96 per cent.

The increase in the number of the polynuclear forms just after the chill is to be explained possibly as a manifestation of chemotaxis due to toxines circulating in the blood, or as an evidence of regeneration.

The confusion of typhoid with malarial fever, especially the fall type of the latter, is something that we must be on our guard against. In the latter form of malarial fever the temperature is often elevated for days, the patient is dull and listless, the tongue is heavily coated, the spleen is readily palpable, and Ehrlich's diazo-reaction occurs in the urine. In short, with the exception of the absence of the diarrhœa and rose-spots, there is a tolerably complete picture of typhoid fever. In Cases 11 and 12 the temperature remained elevated for four and three days respectively. The organisms of this type of malarial fever are very easily overlooked. For the first week or so after the beginning of the illness the only forms of organism present in the peripheral circulation are the so-called "hyaline" bodies. These are very small, and to one unaccustomed to examining malarial blood are readily confused with vacuoles in the red corpuscles. The crescentic forms of the organism do not appear until later in the disease, and the segmenting forms are not found in the peripheral circulation.

Uskow has called attention to the fact that in typhoid fever there is no leucocytosis, and that there is a diminution in the percentage of the polynuclear leucocytes with a corresponding increase in the percentage of the large mononuclear forms. This he believes to occur regularly in uncomplicated cases of typhoid fever, and his statement has been verified by a number of counts made by Dr. W. S. Thayer and myself at the Johns Hopkins Hospital. But this condition of the blood is exactly the same as the one which obtains in malarial fever of the fall or æstivo-autumnal type. So that the estimation of the number of leucocytes, and the determination of the proportions of the various forms by means of stained specimens, are not sufficient for the diagnosis of typhoid unless we can definitely rule out the presence of malarial organisms.

In conclusion, a few words may be added about the leucocytes in malarial anæmia.

While the occurrence of a leucocytosis in most secondary anæmias is the rule, it is never very marked, rarely being above 15 to 18,000. In four cases of malarial anæmia which we have had under observation the increase in the number of leucocytes was striking. In two cases where the red corpuscles ranged just above 3,000,000 per cmm. the leucocytes were 28,000 and 30,000 respectively. In another case the red corpuscles were just under 2,000,000, while the leucocytes reached 40,000. In the fourth case the red corpuscles were 3,600,000, a relatively mild anæmia, while the leucocytes ranged above 20,000 for a week. In all four cases the increase was solely in the polynuclear leucocytes.

ON THE PRESENCE OF IRON IN THE GRANULES OF THE EOSINOPHILE-LEUCOCYTES.

By Lewellys F. Barker, M. B., *Associate in Anatomy, Johns Hopkins University.*

A short time ago, while making some experiments concerning the metabolism of the parasites of malaria, I treated a number of smeared cover-slip preparations of blood taken from patients suffering from the disease, with reagents used for the micro-chemical demonstration of iron.

Among other tests, the delicate method elaborated by Macallum* of Toronto, for the demonstration of iron in chromatin, was employed. Dr. Macallum has found that by treating freshly teased cells from various tissues, both animal and vegetable, with a mixture of recently prepared ammonium sulphide and glycerine, and leaving the preparation on a glass-slide under a cover-glass in the thermostat at 60° C. for some days, that the chromatin of the cell-nuclei assumes a distinct green or greenish-black tinge, indicating the presence of iron. He was able to demonstrate, too, in his experiments on the absorption of iron† in certain animals, the presence of that metal in the epithelial cells of the intestine and within the protoplasm of many leucocytes, especially at the beginning of the central lacteals in the villi. Iron, not demonstrable by the ordinary micro-chemical reactions, ("masked iron"), could easily be rendered apparent by the prolonged action of the heated sulphide and glycerine, especially if teased preparations were used so that the reagent could surround on all sides the cells to be acted upon.

In my experiments, cover-glass preparations, such as are employed for the color-analysis of the leucocytes according to the methods of Ehrlich, were heated on the copper bar at a temperature of 120° C. for from one to two hours, and were then treated in the following way: A drop of solution of ammonium sulphide, prepared just before using, was placed upon the smeared surface of the cover-slip, and this was immediately laid upon a drop of glycerine, the glycerine and sulphide-solution mixing, upon a large thick glass-slide. The preparation was then placed in the thermostat at 60° C. Once as early as after 6 hours, but usually at the end of 24 hours, and more markedly at the end of 48 hours, the greenish-black iron reaction in the chromatin of the nuclei of the white corpuscles was apparent in the specimens. By this time the hæmoglobin of the red corpuscles had assumed only a slight greenish tint. In an occasional leucocyte, however, granules of the size and shape of the eosinophile granules were very distinctly stained yellowish-green.

To make sure that the granules were really those of the eosinophile-leucocytes (although the morphology of these granules is in itself so typical that they can as a rule be recognized in fresh unstained specimens of blood), some cover-slip preparations known by control-studies of slides stained with the triple stain to contain a much larger number of eosinophile-leucocytes than normal, were submitted to the same test. In these too the eosinophile granules stained sharply. The blood taken from a patient whose blood contained 18 per cent. of eosinophiles yielded very striking pictures.

The granules in the sulphide-glycerine preparations do not assume quite the same tint as do the nuclei of the leucocytes; the latter are stained greenish-black and have a dull appearance; the eosinophile granules by contrast are more highly refractive, and while stained greenish-black show also a slight yellowish tint.

The finer neutrophilic granules within the protoplasm of the leucocytes with polymorphous nuclei do not yield any visible iron-reaction.

Sherrington in his article* on the changes in the leucocytes, in certain inflammations, describes carefully the various forms of white corpuscles, including the eosinophiles (coarsely granular leucocytes). He did not notice any marked alteration in the coarse granules on treatment with ammonium-sulphide (p. 200), probably because the specimens were not submitted to the high temperature necessary for the demonstration of "masked" iron. Sherrington found, however, that with the ammonium-molybdate test as applied in micro-chemical work by Lilienfeld and Monti, that the eosinophile granules yielded a distinct though faint reaction for phosphorus. He also convinced himself of the presence of a basophilic membrane surrounding the eosinophilic (oxyphile) granules.

The significance of the leucocytic granulations is as yet not fully understood. An attempt has been made to assign to the eosinophile granules a definite function in protecting the organism against bacterial invasion. It may be that the results of the micro-chemical tests above referred to will be of some aid in coming to a conclusion regarding their import.

* Macallum, A. B., On the demonstration of the presence of iron in chromatin by micro-chemical methods. Proc. Roy. Soc., Vol. 50.

† Journal of Physiology, Vol. XVI, Nos. 3 and 4.

* Proc. Roy. Soc., Vol. LV, No. 332, pp. 161–206.

THE JOHNS HOPKINS HOSPITAL REPORTS, VOL. IV, Nos. 4 and 5.

REPORT IN NEUROLOGY, II.

By HENRY J. BERKLEY, M. D.

Contents: I.—Dementia Paralytica in the Negro Race. II.—Studies in the Histology of the Liver. III.—The Intrinsic Pulmonary Nerves in Mammalia. IV.—The Intrinsic Nerve Supply of the Cardiac Ventricles in Certain Vertebrates. V.—The Intrinsic Nerves of the Submaxillary Gland of *Mus musculus*. VI.—The Intrinsic Nerves of the Thyroid Gland of the Dog. VII.—The Nerve Elements of the Pituitary Gland.

Price, $1.50. Address The Johns Hopkins Press, Baltimore, Md.

ON THE VALUE OF REPEATEDLY WASHING OUT THE STOMACH AT SHORT INTERVALS IN CASES OF OPIUM OR MORPHINE POISONING.

By L. P. Hamburger.

(*From the Pharmacological Laboratory of the Johns Hopkins University.*)

Among the many researches that have been made on the physiological, therapeutical and toxicological properties of morphine since its isolation by Sertürner in 1817, those of Marmé,* Leineweber,† Alt,‡ and Tauber,§ demonstrating its elimination by the gastric mucous membrane take a leading place. The medical profession in general does not seem, however, to be familiar with the practical applications that may be made of this discovery and it is worth while to record the following case of opium-poisoning in which a chemical examination was made of the urine and of successive stomach washings, especially since the results agree with those found by the above-mentioned investigators in their experiments on animals.

On the evening of May 2, 1894, 660 cc. of a sherry-red fluid was sent from the hospital to the pharmacological laboratory, the liquid being part of the washings of the stomach of a Chinaman, Lee Hee, who had attempted suicide.

A report was requested as to the kind of poison that had been taken. The fluid was clear, with a few bits of orange pulp floating in it, and it smelled faintly of crude opium; it was filtered and gave the characteristic meconic acid reaction, namely, the red color with ferric chloride or ferrous sulphate which persisted on the addition of hydrochloric acid and also when boiled. A second portion of the filtered fluid was made alkaline with sodium hydrate, shaken up with ether, the ether removed and evaporated, the yellowish-white residue from the ether dissolved in a little acidulated water and this solution examined for alkaloids. It responded perfectly to the following reagents: platinic choloride, iodine in potassium iodide solution, sodium molybdate in sulphuric acid (Fröhde), potassium-bismuth iodide and potassium-mercuric iodide. The presence of meconic acid and of alkaloids being demonstrated, it became evident that we were dealing with poisoning by opium.

Lee Hee is supposed to have taken the opium at about 10 a. m., and the quantity taken we estimated to be at least ten grams, judging from the amount that still remained in the little jar which was known to have been full when the suicide was attempted.

About half-past five Lee Hee was brought into one of Prof. Osler's wards in a comatose condition and it was evident from the state of his respiration and circulation that he was not likely to recover. At this time the stomach was first washed out and the process was repeated until the physicians in charge had reason to think that there was no longer any opium in the stomach. A second lavage was made at 8 p. m., and a third at half-past eleven, a quarter of an hour before death. The fluid secured in these last two washings was colorless and from this fact it may be concluded that all the crude opium had been removed by the first washing, though unfortunately this conclusion could not receive positive proof, since the last portion of the first washing was not kept separate from the rest and chemically examined. All three washings were examined for opium and morphine and the results, which will presently be given, at least demonstrate the practical value of repeated stomach washings, even after all ordinary signs of opium, such as color and odor, are no longer found.

At 6 p. m., 75 cc. of urine was removed by the catheter and submitted to a chemical examination by Landsberg's method for the detection of morphine in the urine.* The residue finally obtained was a mixture of urea and morphine. No difficulty was experienced in identifying the former, it appeared in the characteristic four-sided prisms with pyramidal ends. In addition to these crystals of urea there were seen numerous very small rhombic prisms. Whether the latter were certainly crystals of morphine was not determined; nevertheless the chemical tests demonstrated the presence of morphine in considerable amount. This difficulty in separating morphine from urea is not peculiar to this case,† but is due to the fact that both behave toward solvents in much the same way. Control tests showed that urea does not interfere with the following morphine reactions. A minute quantity of the residue dissolved in water and treated on a porcelain dish with a drop of ammonium molybdate, gave a yellow precipitate, and the addition of a drop or two of concentrated sulphuric acid caused that beautiful play of colors, violet, blue and green, which solutions of morphine give under the same conditions (Fröhde). A fragment of iodic acid added to the diluted residue was reduced and the free iodine recognized by shaking with chloroform. In this way the presence of morphine in the urine was demonstrated. In the present case, therefore, there was no difficulty in proving the elimination of at least a part of the ingested alkaloid through the urine. Yet there is probably no point in the physiological history of morphine which has given rise to more controversy than its presence or absence in this excretion. The controversy involves not only the immediate experimental results but the more general problem of the fate of morphine in the body. Thus, some observers after demonstrating that the alkaloid was present in the urine claimed that it passed through the body unchanged; others, failing to find it, argued that it suffered a destructive oxidation and could not be demonstrated as mor-

* Untersuchungen zur acuten u. chronischen Morphinvergiftung. Deutsche Med. Wochenschr., 1883, nr. 14.

† Ueber Elimination subcutan applicirter Arzneimittel durch die Magenschleimhaut. Inaug. Dissert. Göttingen, 1883.

‡ Untersuchungen über die Ausscheidung des subcutan injicirten Morphins durch den Magen. Berl. Klin. Wochenschr., 1889, nr. 25.

§ Arch. f. exp. Path. u. Pharmakol., Bd. 27, S. 336.

* Pflüger's Archiv, Bd. 23, S. 425 (1880).

† Neubauer u. Vogel, Analyse des Harns, Th. 1, S. 359.

phine in the urine. But it is now generally admitted that after large doses of the alkaloid a small quantity appears in the urine.

It is in the stomach, however, that the elimination of morphine proceeds most actively. The practical importance of this gastric excretion will be evident upon considering the results of the stomach washings in the present case.

Of these there were three as already mentioned. The first was the sherry-red fluid giving meconic acid reactions, and upon treatment by the method of Stas, alkaloidal reactions. This fluid was treated like the urine and a similar brown residue was obtained. This residue was dissolved in water, acidulated with hydrochloric acid and again evaporated. During this evaporation a white precipitate separated out which upon examination was found to be calcium phosphate, one of the inorganic constituents of opium. Having removed this salt, the residue was dissolved in warm absolute alcohol and allowed to evaporate spontaneously. Morphine crystals of a definite type were not obtained, but the solution gave beautiful morphine reactions; reducing iodic acid, responding to Fröhde's reagent, and giving a pink color with sulphuric and nitric acids (Husemann).

As already stated, it was believed that all the opium was removed during the first washing, and the fact that the second washing came out colorless seems to confirm this view. Nevertheless the latter liquid gave fine alkaloidal reactions, but did not respond to the tests for meconic acid. In other words, at the first washing the ingested but unabsorbed opium was removed; between this first lavage and the second the alkaloids had accumulated again. How? It could only have been through an excretion by the gastric mucous membrane. Nor did the elimination of the poison stop at this period; for, the third washing made several hours later, colorless also, still gave good reactions.

The meaning of these results must be clear. They point to the excretion of the alkaloids of opium by the mucous membrane of the stomach and suggest a practical application of this fact. If, as has been shown, these alkaloids, and morphine in particular, are excreted into the stomach, then washing this viscus repeatedly and at very short intervals to remove the alkaloids as fast as they are eliminated, must certainly be a life-saving process whether the poison has been taken by mouth or hypodermically. Poisoning by the latter method has not, as far as can be ascertained, been treated in this manner in spite of Alt's demonstration of the presence of morphine in the stomach washings of men who had received 3 cg. of the hydrochlorate subcutaneously. The quantity of the alkaloid capable of being removed by repeated washings has been estimated at almost one-half. Tauber also recovered 41.3 per cent. from the faeces of dogs to whom morphine was administered subcutaneously but where the stomach had not been washed out. Alt has ascertained that for dogs, doses of more than 10–12 cg. morphine pro kilo may be considered lethal; 17 cg. pro kilo almost invariably caused death. On the other hand, if, immediately after the injection, the stomach was washed and the lavage continued for forty-five minutes, then 10–12 cg. pro kilo never produced serious symptoms, and indeed with 17 cg. and even 20 cg. pro kilo the symptoms of poisoning were not so severe as when 12 cg. were administered without repeated washing. Two dogs were saved after the injection of so large a quantity as 24 cg. pro kilo. This evidence goes to prove that the excreted morphine is reabsorbed and that it still has toxic properties; and may not the frequent relapses following apparent recoveries from overdoses of morphine* also furnish proof of such reabsorption? By a continuous lavage the exchange that goes on between the gastro-intestinal mucous membrane and the general system would be interrupted, and in proportion as the alkaloids excreted by the mucous membrane are removed the effects of their reabsorption would be avoided. Conformably to the results of Alt's experiments, the lavage should be repeated at short intervals, and the sooner this can be done after the opium or morphine has been taken, the better. In the case cited in this paper no successful outcome could be anticipated, because too long a time elapsed between the taking of the opium and the beginning of the treatment.

In connection with this subject it may be well to repeat Kobert's† suggestion, that a chemical examination of the faeces should be made in cases where the morphine habit is suspected but is denied by the patient, and where for various reasons it is difficult to secure conclusive evidence of the fact in other ways.

*See for example, Souchon: "On relapses following recoveries from overdoses of injections of morphine," N. Orl. M. & S. J., XIV, pp. 437–39, 1886–87; Taylor: "Lancet," Vol. I, p. 937 (1884).

†Lehrbuch der Intoxikationen, p. 561.

DEATH OF JAMES CAREY, TRUSTEE OF THE JOHNS HOPKINS HOSPITAL.

Minute adopted by the Board of Trustees of the Johns Hopkins Hospital, October 9, 1894.

The Trustees of the Johns Hopkins Hospital, having learned with deep sorrow of the sudden death of James Carey, one of its most faithful and conscientious members, desire to put upon permanent record their appreciation of his character and services. He was the soul of integrity and uprightness in every relation in life. His heart was full of sympathy for the sick, the sorrowing and the unfortunate. It can be said of him that he wronged no man in thought, word or deed, but was kind and helpful to all. He had no enemies, but many friends. He loved children, and was tender and gentle with them to a remarkable degree. He took great interest in the Johns Hopkins Colored Orphan Asylum and was eager to develop a better work in the new buildings in course of erection. At the last meeting of the Trustees he attended he was in full sympathy with new plans for the care and training of colored orphans. He was also peculiarly interested in all the humanitarian aims and work of the Hospital, and his sound judgment and wise counsel commanded the highest respect of his associates. After a pure life, full of good deeds and kindly impulses, he has gone to his reward.

THE BACILLUS OF THE PLAGUE.*

ABSTRACT OF REPORT TO THE JOURNAL CLUB OF THE JOHNS HOPKINS HOSPITAL.

The epidemic of the black plague which broke out in May last in Hong-Kong and was very destructive to the Chinese population, will be made memorable in the history of modern medicine on account of the simultaneous discovery by a French and a Japanese investigator of the micro-organism which there is reason to believe is the cause of the disease. These two investigators, who are already well known to the scientific world through their important previous contributions to the literature of bacteriology, are Drs. Yersin and Kitasato.

The former, Dr. Yersin, who was sent by the French government, owing to the danger to their Indo-Chinese possessions, with instructions to study the nature of the plague, the conditions under which it is propagated, and to search for more effective means for preventing the invasion of their possessions, arrived in Hong-Kong on June 15th.

Dr. Kitasato, accompanied by Dr. Aoyama, was sent by the Japanese government, and arrived at Hong-Kong on June 12th. Dr. Aoyama was delegated to study the clinical and pathological features of the disease, whereas Dr. Kitasato was to undertake the investigation into its ætiology. Dr. Aoyama became infected with the disease, but recovered. Hence the report of their investigations relates quite exclusively to the bacteriology of the disease.

On June 14th the first autopsy was conducted by Dr. Aoyama, and the blood and organs were studied for micro-organisms by Dr. Kitasato, who at the same time made cultures. Under the microscope bacilli were found in the cover-slips, but as the individual had been dead 11 hours the result was not considered conclusive. However, guinea-pigs were inoculated with a bit of the spleen and the blood from the case.

On the same day, in the blood taken from the tip of the finger of patients sick of the disease, bacilli agreeing in form with those found at the autopsy were again met with. The next day (June 15th) the blood-serum cultures made from the autopsy of the previous day showed upon examination a growth of micro-organisms which resembled the bacilli already seen. From these cultures a guinea-pig, mouse, rabbit and pigeon were inoculated.

The guinea-pigs inoculated from the spleen and the blood of the patient dead of the disease, were dead on the second day, and the autopsy upon these animals showed œdema at the seat of inoculation, and the bacilli were recovered from the viscera of the animals. Of the animals inoculated with the growth from the serum-cultures, all died, in from 1 to 4 days, according to the size of the animal, excepting the pigeon. The latter survived. The post-mortem examinations of these animals confirmed the conditions observed in the first experimental guinea-pigs.

Kitasato found the blood of human beings, dead of the plague, to contain the bacilli often in such small numbers that in many preparations perhaps not more than 2 or 3 organisms could be found; while the lymph glands, spleen, liver, lungs, brain and intestines always showed many bacilli, which could be cultivated. At times in cover-slips made from the inguinal glands and spleen the number of organisms was so great as to suggest that they had been made from a culture. In all the inoculations from the organs a single organism in pure culture was invariably obtained.

The characters of the bacillus.—The micro-organism obtained in all instances consists of short rods, with rounded ends, resembling the bacillus of chicken cholera, and possessing a capsule. This capsule is at times quite distinctly marked, at others it is difficult to see. The bacillus stains in aniline dyes, the ends staining mor deeply than the middle portion. According to Yersin it is decolorized by Gram's staining method. It is described by Kitasato as being very motile.

Upon blood-serum, after 24 to 48 hours, at the body temperature, the bacillus grows abundantly, the growth appearing moist and of a yellowish-gray color. No liquefaction of the blood-serum occurs. It also grows upon agar, but better upon glycerine-agar, forming a grayish-white surface growth. The colonies in agar plates show a bluish translucence. They are round, or present slightly irregular contours, and are moist in texture. The young colonies are glass-like in appearance, but in the older ones the central part becomes thicker and more opaque. In bouillon, according to Kitasato, a cloud is produced, whereas Yersin compares the growth in this medium with the appearance produced by the streptococcus erysipelatos, namely, the formation of small granules which settle upon the sides and to the bottom of the test-tube. Stab cultures show after 1 to 2 days a fine dust-like line of growth. The bacillus does not grow on potato, in 10 days, at the ordinary temperature, but after two days at the temperature of 37.5° C. a growth, gray in color and with a dry surface, was observed. The mean temperature of Hong-Kong was too high to permit of gelatine being used.

The most favorable temperature for the growth of the bacillus seems to be from 36° C. to 39° C. According to Kitasato, it does not form spores. Cover-slip preparations from young agar-agar cultures show forms resembling chains of cocci, but older ones present distinct bacillary forms.

Effects upon animals.—The animals used for experiments were those previously mentioned, namely, rabbits, guinea-pigs, rats, mice and pigeons, and in Kitasato's experiments, sheep. With the exception of pigeons, all these animals proved to be

* The importance of the discovery of the micro-organism believed to be the cause of the plague seems to justify the publication of abstracts of the two original papers which have just appeared on the subject. Moreover, as one of them (Kitasato's) appeared originally in Japanese and is therefore relatively inaccessible to English readers, it seems less necessary to apologize for presenting the results together at this time. This it would have been impossible for me to do but for the kindness of Dr. S. H. Sanobe, now attending upon the post-graduate courses at the Johns Hopkins Hospital, who kindly read the Japanese paper to me. The two papers are to be found in the Sei-i-Kwoi (Medical Journal), Tōkyo, for Sept. 8, 1894, and Le Bulletin Médical, Sept. 23, 1894. In the latter a French abstract of the report of Dr. Kitasato is also given. —Simon Flexner.

susceptible. The symptoms of the disease developed in the inoculated animals from the first to the fourth day, depending upon the size of the animals. According to Kitasato, the animals are uniformly small at Hong-Kong, the average weight of guinea-pigs being 115, and of rabbits 200 to 250 grams.

The first effects of the subcutaneous inoculation were already perceptible in Yersin's cases after a few hours. The seat of inoculation became œdematous, and the adjacent lymph-glands could be felt. After 24 hours the animal is quiet, the hair is rumpled, tears run from the eyes, later convulsions set in which usually continue until death occurs. At the seat of inoculation there is hemorrhagic œdema, the lymph-glands are swollen, the intestine is sometimes hyperæmic, the adrenal glands congested, the kidneys purple, the liver large and congested, and the spleen is much enlarged, showing, at times, according to Yersin, an eruption of miliary tubercle-like nodules. The bacilli can be recovered from the organs of the experimental animals.

In this connection it is interesting to note that in the part of the city where the disease prevailed many rats were found lying dead upon the ground and in the houses of the diseased; and it is stated by Yersin that in the epidemics of Pakhoi and of Lien-Chu, in the province of Canton, it had been observed that before the plague attacked human beings it raged with great intensity among mice, rats and swine.

Habitat of the bacillus.—It has already been mentioned that the blood and organs of human beings and experimental animals dead of the plague contain the bacillus. The same organism has been obtained from the rats found dead in the infected district, and Yersin having observed that the flies which infested the laboratory in which his autopsies on experimental animals had been conducted were dying in large numbers, found on making cultures from one that it contained the organism. Kitasato inoculated three guinea-pigs with the dust derived from the room in which there was a case of the plague. Of these two died of tetanus; the remaining one died with the symptoms of the plague, and the bacillus was obtained from the internal organs. Yersin obtained earth at a distance of 4 to 5 centimeters below the surface from the soil of an infected house. From this cultures were made, and bacilli having the cultural properties and the form of the plague bacillus were isolated. These were, however, devoid of virulence.

Yersin pointed out in a previous part of his paper that in cultures from the glands or the blood the colonies grow with different degrees of rapidity, and the more rapidly growing ones are less virulent than the slower ones. Thus the growth derived from a particular colony might kill guinea-pigs after a longer period of incubation, or not at all, and yet be fatal to mice. He also obtained from a gland which had been removed in the third week of the disease, a culture of the organism which was destitute of pathogenic properties, even for mice.

Healthy mice placed in the same cage with inoculated mice succumb to the disease, although later than the infected ones; and susceptible animals fed with food containing the bacillus may die and present the characteristic lesions.

Action of physical and chemical agents on the vitality of the bacillus.—These experiments were conducted by Kitasato.

a) *Physical.*—1st. Drying. Cover-slips were made from the infected lymph-gland, and exposed in a room having a temperature of 28° to 30° C., being protected from sunlight. These were dropped into bouillon at varying periods. Those exposed from 1 to 36 hours gave a growth when kept in the thermostat for two days, while cover-slips which had been exposed for four days gave no growth in bouillon at the end of seven days in the thermostat.—2d. Sunlight. Cover-slips prepared in the described manner failed to give any growth whatever after an exposure to the direct rays of the sun for 3 to 4 hours. The experiments were repeated with a pure culture of the bacillus made upon blood-serum with the same results.—3d. Heat. Bouillon-cultures were killed in ½ hour at 80° C. In steam at 100° C. all the organisms were killed in a few minutes.

b) *Chemical.*—1st. Carbolic acid. Three-day old bouillon cultures were treated with quantities of carbolic acid equaling 0.5 per cent., 0.75 per cent. and 1.0 per cent. of their volume. From these mixtures inoculations were made into fresh bouillon every few minutes.

0.5 per cent. carbolic acid. After one hour's contact at room temperature, a growth in two days at temperature of the thermostat.

0.75 per cent. carbolic acid. Same result.

1.0 per cent. carbolic acid. After one hour's contact no growth in one week at 37.5° C.

0.5 per cent. carbolic acid. After two hours' contact at room temperature, no growth in one week at 37.5° C.

2nd. Milk of lime. The same plan was pursued, using the solutions of the same strength.

0.5 per cent. milk of lime. After 2 hours' contact a very slight growth.

0.5 per cent. milk of lime. After 3 hours' contact no growth.

1.0 per cent. milk of lime. After 2 hours' contact no growth.

Symptoms of the disease.—The disease comes on suddenly after an incubation period of 3 to 6 days. There is great lassitude and prostration. The temperature rises, and delirium may be present. In 75 per cent. of the cases the glands of the groin become swollen, in 10 per cent. those of the axilla, and rarely those of the neck and other regions. The tongue is heavily coated and black in color. Vomiting and diarrhœa may occur, and are considered as being very unfavorable. Death may occur in 48 hours, and frequently it takes place sooner. Should the patient live until the 5th or 6th day the prognosis is better. The enlarged glands may go on to suppuration and the abscesses so formed heal very slowly. The disease attacks males and females, the old and the young. The mortality in this epidemic is given by Kitasato as 75 to 85 per cent., by Yersin as 95 per cent.

Kitasato examined the blood of 30 cases, 25 of which gave positive results. Of the remaining five, two were proven not to have the disease; the remaining three were doubtful. The organisms are difficult to see in cover-slips from the blood; it is therefore necessary to make cultures.

The conclusions which are appended to Dr. Kitasato's report are as follows:

1. In the plague, bacilli are found in the blood, glands and viscera.

2. This particular bacillus is not found in any other disease.

3. Obtained in pure culture it is capable of producing in inoculated animals the same effects as in human beings.

4. It gains entrance into the body through (*a*) the respiratory tract, (*b*) excoriations of the surface, (*c*) the digestive tract.

5. The disease prevails especially under faulty hygienic conditions; it is therefore urged that general hygienic measures be carried out. Proper receptacles for sewage should be provided; a pure water supply afforded; houses and streams are to be cleansed; all persons sick of the disease isolated; the furniture of the sick washed with a 2-per cent. carbolic acid solution in milk of lime; old clothes and bedding are to be steamed at 100° C. for at least 1 hour, or exposed for a few hours to sunlight. If feasible, all infected articles should be burned. The evacuations of the sick are to be mixed with milk of lime; and those who die of the disease are to be buried at a depth of 3 metres, or, preferably, cremated. After recovery the patient is to be kept in isolation at least one month. In one case he was able to demonstrate bacilli in the blood after the third week. All contact with the sick is to be avoided, and great care is to be exercised with reference to food and drink.

PROCEEDINGS OF SOCIETIES.

THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY.

Meeting of May 7, 1894 (continued).

Dr. Kelly in the Chair.

Report of Twelve Cases of Complete Radical Cure of Hernia, by Halsted's method, of over two years standing. Silver wire sutures.—Dr. Halsted.

Dr. Bloodgood has very kindly written to all of the old hernia cases in town and to several living out of town, requesting them to come to show themselves to-night. It is now nearly five years that we have done this operation for the radical cure of hernia. You may remember that a little more than a year ago we reported 89 cases of hernia, and that there were no recurrences in the cases of union by first intention. In 6 cases there was more or less of a recurrence, but all of these cases had suppurated for some reason or other, and had healed by granulation. It remains to be seen whether or not there are any returns amongst the cases here to-night.

This first man was operated upon only two weeks ago to-day. In this case and other recent cases we have used silver sutures instead of silk, not because we wish anything stronger than silk, but because of the results of experiments which Dr. Bolton has kindly made for us, and which we have made, to determine the power of different metals to inhibit the growth of bacteria. This line of experimentation is not entirely original with us. Dr. Bolton has found that zinc and cadmium and copper are perhaps the best metals to inhibit the growth of organisms. Silver is perhaps the next best metal, and we are using therefore silver wire altogether, both for deep buried sutures and for the continuous buried skin sutures. This is a beautiful instance of healing by first intention.

Since my last report of a year ago we have had a great many cases of hernia, and so far there have been, we believe, no recurrences.

OLD CASES OF HERNIA EXHIBITED AT THE MEDICAL SOCIETY.

Case 1. J. B., æt. 48. Had a very large right, oblique, inguino-scrotal, reducible hernia of fifteen years standing. Operation in August, 1889 (four years and six months ago). The bladder was caught in one of the stitches, and the wound consequently was laid open and allowed to heal by granulation. The scar now is firm, depressed, 12½ cm. long, and about 1 cm. in width, there is no impulse on coughing, no change in the cord or testicles, the man suffers no inconvenience from the wound.

Case 2. F. F., æt. 7 (boy). Small, right, congenital, inguinal, reducible hernia. Operation in October, 1889 (four years and four months ago). Wound healed per primam; there is a narrow linear scar, no impulse on coughing, no change in cord or testicles, no discomfort from wound.

Case 3. H. S., æt. 37 (colored). Large, right, inguinal, reducible hernia of two years duration. Operation February, 1890 (four years ago). Healed per primam; there is a narrow linear scar 9 cm. long, firm, no impulse, the little finger can detect the opening in the muscle through which the transplanted cord passes, no inconvenience from wound, no change in cord or testicles. Patient does heavy work.

Case 4. E. P., æt. 7 (girl). Small, right, oblique, inguinal, reducible hernia of two months duration. Operation November, 1890 (three years and four months ago). Healed per primam, except a small superficial stitch abscess, the scar is white, 11 cm. long and about ¾ cm. wide, firm, no impulse, no discomfort.

Case 5. A. E., æt. 5. Small, right, oblique, inguinal, reducible hernia of four years duration. Operation by Dr. Brockway (McBurney's method) in July, 1890. The hernia recurred, and in November, 1890 (three and one-half months afterward), a second operation by Halsted's method was performed. The wound healed per primam, notwithstanding the fact that the child had whooping-cough. It is now three years and three months since the last operation, and there is no return of the hernia.

Case 6. F. S., æt. 27. Small, left oblique, inguinal, reducible hernia of two months duration, following typhoid fever. Operation February, 1891. Healing per primam, except for a small superficial stitch abscess. It is now three years since the operation. The scar is firm, white, 12 cm. long. There is no impulse on coughing. No discomfort. Testicles and cords normal.

Case 7. J. T., æt. 47. Small, right, oblique, inguinal, reducible hernia of six weeks duration. Operation February, 1891 (three years ago). Healed per primam. The scar is narrow and white, 13 cm. long, firm. No impulse on coughing. No discomfort. Testicles and cords normal.

Case 8. W. C. W., æt. 2½. Small, right, inguino-scrotal, congenital, reducible hernia. Operation July, 1891 (two years and eight months ago). Scar white, linear, 8 cm. long, firm. No impulse on coughing. No change in cord or testicle.

Case 9. G. B., æt. 22. Right, oblique, inguino-scrotal, reducible hernia, noticed at birth; wore a truss from eight to thirteen years old. Operation August, 1891 (two years and seven months ago). The scar is 13 mm. wide and 12 cm. long, white, firm. No discomfort. On coughing there is a slight impulse at the lower end of the scar just above the pubes, corresponding to the external ring. There is no return of the hernia.

Case 10. A. McI., æt. 26 (colored). Right, oblique, inguino-scrotal hernia, reducible for four years, strangulated on admission. Operation August, 1891 (two years and seven months ago). The veins were very large and excised, healing per primam, except at the upper end, in which there was superficial suppuration, November, 1893. Hydrocele and testicle, on the same side, removed

because they gave discomfort. The scar is firm, there is no impulse on coughing. No discomfort.

Case 11. J. W. B., æt. 5. Small, left, oblique, inguino, reducible hernia, following whooping-cough at four months of age. Operation September, 1891 (two years and five months ago). The wound suppurated at its upper third and healed by granulation. The scar is 2 mm. wide, it has stretched some. Is 8 cm. long and firm. No impulse on coughing. Testicle and cord normal. There had been an epididymitis following the operation, the induration from which lasted for six months.

Case 12. H. P., æt. 29. Small, right, inguinal, irreducible hernia of two years duration. Operation October, 1891 (two years and five months ago). There were no adhesions in the sac. Wound suppurated and healed by granulation. There was a stitch sinus for three months. The scar is firm, but has stretched a little. It is 11½ cm. long. The abdominal walls of this patient are so very thin that on coughing there is an impulse above Poupart's ligament on both sides. The impulse is as great on one side as on the other.

Recent Results in Hysteromyomectomy.—DR. KELLY.

The technique of no operation in the field of gynecology has been so rapidly advanced as that of hysteromyomectomy. Until a few years ago the removal of a myomatous uterus was considered one of the most dangerous operations, and was only resorted to when the patient's life was in imminent danger from the further growth of the tumor or from the secondary results such as high grade anæmia, pressure from adjacent organs, etc.

Less than twenty years ago the first attempts at the extirpation of these myomatous uteri were made, and the mortality following these operations was so appalling as to cause all but a few to shrink from the operation.

Some ten years ago, Professor Schroeder, of Berlin, with the courage of his convictions, began with great earnestness to advocate the total extirpation of myomatous tumors, and although his attempts were followed by a very high rate of mortality he persisted, believing that better results would follow as the steps of the operation were perfected. These anticipations were not realized during his life, but in the light of the statistics of to-day his prophecy for the future is well sustained. At the present time the mortality following this operation is little if any greater than that following the average run of ovariotomies.

We now consider the operation indicated when the tumor is rapidly growing even though no uncomfortable symptoms are produced by its presence, as sooner or later, in the great majority of cases, untoward symptoms will arise which not only endanger the patient's life, but also render the operation in the presence of these complications much more difficult.

As will be seen from the analysis of 50 cases of hysteromyomectomy, made for me by Dr. Clark, there are quite a number of indications for operation.

From the standpoint of relative frequency of myoma in the white and colored race this analysis of 50 cases, while small in number, yet serves to bear out a statement made by me some months ago before the South Carolina Medical Society, that myomata were as frequent in white as in black women.

A number of those present at that meeting took exception to this remark, claiming that white women were able, being better situated financially, to come greater distances for treatment than were the impoverished colored women who, perforce of circumstances, must remain at home.

But according to the relative frequency as indicated by this table the proportion is as 6½ to 1, there being 43 whites to 7 blacks. Of the latter 6 appeared to be of pure African descent, the seventh was a mulatto.

While the criticism offered by these gentlemen bears a certain weight, yet from the very fact that we are in the center of a large negro population in Maryland and the adjacent States of Virginia and Delaware, the proportion should be very different from this which I present, if the statement that myomata are more frequent in the colored than in the white race is to be sustained.

The ages of the patients at time of the operation *averaged* 42.5 years, the oldest being 59 and the youngest 25 years of age.

This part of the analysis is interesting as showing the prevalence both among physicians and laity of the belief that these tumors will disappear or cease to give rise to discomfort after the menopause.

In a number of these cases the tumor had been discovered two or three years, in a few instances many years before the operation, the patients having delayed operation in the hope that the menopause would relieve them.

Although the above opinion is still held by many worthy gynecologists I give it little credence, as according to my experience, instead of decreasing in size, a number of these tumors take on their most active growth after the menopause, while in many other cases the menopause is delayed five years or longer by their presence.

Continuing the analysis further, I find that 37 of the women were married and thirteen single. Of the former, twenty-three bore fifty-six children. Seventeen miscarriages occurred among this number; one patient, however, furnishing ten of these, the remaining seven being distributed among the 22 other women.

The prevailing belief is that these women are as a rule sterile. In the great majority of these cases which I report no children had been borne after the tumor had attained a great size, but on the average the fertility of these women was little below normal.

The following data relating to the menstrual flow bear out the usual statement, namely, that there is deranged menstruation, usually tending to profuse and irregular flow. Of the 50 cases, 9 were normal as to menstrual function; in 35 the flow was excessive, often inclined to free or profuse hemorrhage; while 5 had passed the climacteric.

The major indications for operation were increasing size of tumor, secondary anæmia from persistent or profuse hemorrhage, and pressure symptoms; of the 50 cases, 30 presenting this group of symptoms. In two cases excessive hemorrhage alone was the indication; in four, rapidly increasing size of tumor, although accompanied by no unpleasant symptoms; in five, severe pain. Another indication is the urgent request of a patient to be relieved of her tumor. In such cases I usually advise the patient to wait a certain length of time, usually from six months to one year, and if she is then still urgent in her request I will operate. Two cases in this list were of this character. In one case there was profound mental depression, verging closely on to melancholia, caused by constantly brooding over the fact that she had "a tumor." Operation was followed promptly by complete restoration of the patient's spirits.

In one case the tumor was not detected until pregnancy was six months advanced, and then it so blocked the inferior strait as to require Cæsarean section for the delivery of the child. In this case the uterus was amputated and the pedicle dropped and the abdomen closed as in the ordinary hysteromyomectomy.

Of the remaining 50, one was the subject of an intense pruritus vulvæ, from constant discharge; another, of prolapsus uteri, and a third had attacks of urinary suppression, while two had peritonitis.

Although myomatous tumors are often thought to be unaccompanied by pain, yet my analysis shows that of the 50 cases, 21 complained of pain of varying intensity, from a heavy dragging sensation in the pelvis to acute pain in the region of the uterus or ovaries, often resembling "toothache." A considerable proportion referred their pains to the legs and groins, evidently due to pressure on the sacral and lumbar plexuses.

A complication not infrequently associated with these tumors is inflammatory disease of the appendages, varying in degree from slight adhesions to purulent salpingitis. In this list which I present one such case is found. The presence of pus necessarily renders the operation more dangerous, as the liability to infection

is very greatly increased. In a second case there was a pyometra, the pus escaping into the pelvis when the uterus was amputated. This patient, however, made an uncomplicated recovery. As a precaution against the general distribution of the pus the stump was surrounded by pads of gauze, and at the completion of the operation, before closing the abdomen, the pelvis was thoroughly irrigated with salt solution.

A few words as to the evolution of hysteromyomectomy.

The first mode of operation systematically described and generally adopted was that of Hegar.

According to his method the abdomen was opened, the tumor lifted out, a rubber ligature thrown around the pedicle, the uterus amputated, and the pedicle suspended in the abdominal wound by means of pins. The stump was dressed for two weeks or longer until it gradually separated, leaving a granulating pit in the bottom of the wound. Schroeder soon modified this method by dropping the stump, but his operations were followed by such a high rate of mortality as to prevent the general adoption of this operation.

After having followed Hegar's method in two cases, in Philadelphia, I devised a new operation, which I described as the combined extra- and intraperitoneal method. This included the best principles of Hegar's and Schroeder's methods. Hemorrhage frequently arose from the slipping of the constricting ligature in the Hegar operation. The pedicle was often large, and the encircling ligature, although controlling the hemorrhage during the operation, would subsequently slip after the disappearance of the temporary œdema, and fatal bleeding would follow. This no doubt was the cause of death in many cases.

Schroeder, as did the general surgical world, assigned his high rate of mortality to two causes—sepsis and hemorrhage.

It was accepted without question that the sepsis came from the cervical canal. I was convinced of this fact, and only conducted the first part of my operation according to the plan of Schroeder.

After amputating the tumor I carefully approximated the cervical stump, leaving the sutures long, by means of which I drew the stump up into the lower angle of the abdominal wound, and detained it there by catching the ligatures with artery forceps.

I then attached the peritoneum to the stump on all sides, and closed the abdomen down to the lower angle. Without exception these cases did well, and the wound filled in nicely with granulation tissue.

After having employed this method satisfactorily in a great many cases, I decided to drop the stump completely into the abdominal cavity as one does the pedicle of an ovarian tumor.

Since adopting this method I have performed 50 operations, with only three deaths, the latter being in no way traceable to infection from the stump.

One death was due to septic catgut, another to shock, and the third to sepsis which arose from a superficial eczematous patch in the fold of the abdomen. This patch was protected by a sealed dressing, but during the operation it became displaced. There was extensive infection of the abdominal wound in this case, the peritoneal cavity being free of pus.

Looking back at Schroeder's high rate of mortality we can arrive at but one conclusion, and that is that his antiseptic precautions were not sufficient.

I am now quite certain that a healthy cervical canal does not give rise to infection in these operations.

With regard to hemorrhage, there is little danger if the ligatures are properly placed. There are but four great channels of blood supply to these tumors, regardless of their size, be they large or small, the two ovarian and two uterine arteries.

The two ovarian arteries can be caught easily above and tied off. The accompanying veins are frequently enormously enlarged, and care must be observed not to prick them with the needle, as embarrassing hemorrhage will follow such an accident.

These vessels should be tied also on the uterine side, and cut between the ligatures, thus preventing the blood which remains in the tumor from running down and obscuring the field of operation. Having secured this source of hemorrhage, the broad ligaments are opened, and by dissecting down between their layers with the finger the uterine arteries, the remaining sources of blood supply, are felt beneath the finger on the floor of the pelvis. If these are firmly ligated there is no necessity of throwing a provisional rubber ligature around the base of the tumor while it is being amputated.

The tumor is removed by a circular incision, the vesical peritoneum being first dissected off, as it will be used later to form a hood for the stump. The pedicle is cupped, and with three or four silk sutures of medium size (No. 2) the surfaces of the flaps are brought into apposition. The edges usually require two or three sutures to complete a snug approximation. The redundant peritoneum is then brought together with a continuous silk suture (No. 2), and the female pelvis is converted into one of the male type, all of the structures between the rectum and bladder having been removed.

From the analysis of 50 cases it will be seen that the operation for the total extirpation of myomatous uteri is eminently successful, and when a case presents any of the indications enumerated above should be operated upon.

Summary of 50 Cases of Hysteromyomectomy.

Age.—Youngest, 25 years; oldest, 59 years; average, 42.5 years. 29 of the 50 cases between the ages of 40 and 50.

Married.—37.

Single.—13.

Color.—6 blacks; 1 mulatto; 43 whites.

Children.—13 married were sterile; 23 married women gave birth to 56 children.

Miscarriages.—17 miscarriages occurred, one patient furnishing 10 of these, leaving only 7 to the remaining 22 married women.

Menstrual history.—Menses normal, 9 cases; menses profuse, often inclined to free or continuous hemorrhage, 36 cases; climacteric, 5 cases.

Indications for Operation.—Profuse hemorrhage, increasing size of tumor, secondary anæmia, and pressure symptoms, 30 cases; excessive hemorrhage, 2 cases; increasing size of tumor, 4 cases; pain, 5 cases; urgent request of patient, 2 cases; mental depression caused by presence of tumor, 1 case; myoma blocking inferior strait, preventing delivery of child, 1 case; suppression of urine, 1 case; intense pruritis, 1 case; prolapsus uteri, 1 case; peritonitis, 2 cases.

Of the 50 cases, 23 complained of pain, frequently quite severe, in the region of the tumor.

Drainage.—Gauze, 6 cases; no drainage, 44 cases.

Stitch-hole abscess.—4 cases.

Mortality.—6 per cent.*

* Since reporting these cases before the Johns Hopkins Medical Society I have completed my seventieth operation without any increase in the mortality.

THE JOHNS HOPKINS HOSPITAL REPORTS.

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NOTES ON NEW BOOKS.

Burdett's Hospital and Charities Annual, 1894: being the Year-book of Philanthropy. Edited by HENRY C. BURDETT, Author of "Hospitals and Asylums," etc. (*London: The Scientific Press (Limited). New York: C. Scribner & Sons.*)

One hardly knows which to admire most, the patience displayed in collecting the immense store of statistical information contained in this volume of more than 500 pages, or the skill shown in marshaling and handling the facts to bring about better hospital administration. The book is a marvel of laborious compilation: how great the labor few can realize who have not had a similar task in wringing statistics from indifferent, over-worked or procrastinating public officials. Many of the statistics are of purely local interest, and many of the topics referred to have special bearing upon the English hospitals and training schools for nurses, but the book, as a whole, is profitable to hospital workers throughout the world.

Among them may be mentioned such subjects as the training of nurses in mental cases, hospitals for consumption, homes for the dying, and hospital finances. The author, with a prescience born of long experience, has touched a vital point of hospital administration in his chapter on hospital finances. As he so clearly points out, it is only by a comparison of the figures presented by each hospital that we can accurately determine what good is being accomplished and whether money is judiciously expended.

It is safe to say that those hospitals alone will endure which are able by the results attained to show a reason for their existence. The author had previously presented in another little volume, "A Uniform System of Accounts for Hospitals and Public Institutions," a scheme of classification of expenditures which in his judgment should be generally adopted, and the figures presented in the "Annual" indicate that gratifying progress has been made in securing the adoption of the scheme in England. It is very desirable that some corresponding although probably not identical scheme should be adopted in America, as the conditions of our hospitals, while varying somewhat in details, are essentially the same. In some respects they could be improved. The unit of expenditure should be one day instead of one week, for example, and the cost of maintenance should be reckoned upon the actual number *of days of hospital care given*, and not upon the *weekly cost of the average number of beds occupied* during the year. The cost of out-patients should be reckoned separately. It is interesting to note how widely the conditions of admission and support of patients differ in Great Britain and America. In twelve large hospitals in Great Britain each in-patient must provide for himself tea, butter and sugar. In three hospitals he must bring, in addition, a teacup and saucer, spoon, knife and fork, soap and towel. In fifteen hospitals he must provide a change of personal linen and pay for his own washing. In eighteen hospitals alone are in-patients freed from these extra charges, which must be a serious burden upon their friends and a prolific source of misunderstanding between nurses and patients. In such a wealth of information as is here given upon all topics connected with hospital and training school management, it is difficult to discuss any topic with any adequate fullness in this brief review. The book must be carefully examined by practical hospital workers to be fully appreciated.

Disease and Race. By JADROO. (*London: Swan Sonnenschein & Co.*, 1894.)

The object of this little book is stated to be "an endeavor to show some continuity in disease, to evolve a little order out of existing chaos." The attempt is commendable, but the success of the effort is not great. The order evolved out of existing chaos is largely theoretical and hypothetical, and tends to confuse rather than to make plain. Leprosy is first spoken of, and an effort is made to show that the leprosy of the Bible differs in many respects from leprosy as it appears to-day. Instead of reaching the obvious conclusion that the term translated by the word leprosy possibly included a variety of diseases like psoriasis, scabies and other forms of contagious disease, the author considers that true leprosy as it now appears is a hybrid disease produced by the combination of Jewish or white leprosy and some other disease which has developed in the countries bordering on the Mediterranean in modern times. This he suggests probably originally came from America, and meeting the existing form of leprosy, the two diseases produced a compound or hybrid, taking most of the effects and symptoms of each of them and continuing their course through succeeding generations as one disease, neither being to a sufficient degree either hereditary or contagious to extinguish the other by successive natural inoculations. The result has been to modify the character and especially the contagiousness of leprosy, until as now it appears considerable doubt is expressed by some authors as to its being contagious at all. He further reasons that leprosy and gonorrhœa have produced syphilis, which in turn has been modified by successive transmissions into scrofula, and finally into tuberculosis. Whooping-cough has been modified into measles, and Aleppo-button into plague, and the two latter have combined and produced small-pox. Malarial fever has been modified into miliary fever, and this has been transformed into scarlet fever, and finally into diphtheria—this is surely "a continuity in disease" which would be interesting to study if true. These conclusions are evidently based upon the fact which has long been known, that many forms of disease become modified by passing through individuals, until a severe type at the beginning of an epidemic may become a comparatively mild one at the latter point of it, and the added fact that one attack of an infectious disease often confers an immunity from subsequent attacks. Reasoning from these analogies, our author believes that diseases are so modified as to become essentially new diseases which finally find the race immune to their attacks. This, however, is pure hypothesis. As a matter of fact we have no reason to think the poison of small-pox any less severe except where the severity of the disease has been modified by vaccination. Plague and measles would probably be as severe and contagious as formerly were it not for improved sanitation and more healthful modes of living. Tuberculosis is probably more wide-spread and more fatal now than ever before. The following will serve as a good example of his reasoning:

"That the American continent was either the original home of leprosy or one of its modifications is extremely probable, by the fact of the comparative immunity of the pure-blooded aborigines from leprosy; and this does not shut out the possibility that the disease arose and ran its course in America prior to the commencement of the disease in the Old World from a like cause." This is not unlike the old reason why syphilis was thought to have originated in America because guaiacum was found native here, and it was altogether probable that this disease and what was regarded its only infallible remedy must have been associated. The theory of hybrid diseases enunciated by the author has no countenance in modern bacteriology and cannot be accepted. The book, while interesting as a contribution to speculative medicine, is inconclusive and unsatisfactory.

The Nurse's Dictionary of Medical Terms and Nursing Treatment, compiled for the use of nurses, and containing descriptions of the principal medical and nursing terms and abbreviations, instruments, drugs, diseases, accidents, treatments, physiological names, operations, foods, appliances, etc., etc., encountered in the ward or sick room. By HONNER MORTEN. (*Philadelphia: W. B. Saunders. London: The Scientific Press, Limited.*)

Whatever may be said as to the wisdom of publishing compilations of this character, which do not attain the dignity of dictionaries or nurses' manuals and are somewhat unsatisfactory from both standpoints, there can be no question that the modicum of knowledge contained in them should be free from misleading errors. The

number of typographical errors in the volume before us seems extraordinarily large, as for example, accoûcher for accoucheur, assafœtida for asafœtida, *bulbus occuli* for *bulbus oculi*, cacoglactic instead of cacogalactic, *concha oris* instead of *concha auris*, phagosites instead of phagocytes, pierotoxine instead of picrotoxine, *solens* instead of *soleus*, bilirubrin for bilirubin, etc.

The combination of medical definitions and nursing directions is also far from a happy one. The following will serve as good examples of the method. "Abdomen: The belly; the cavity between the chest and the groins. In abdominal injuries a nurse has usually to keep her patient at rest and watch for signs of peritonitis. *Laparotomy is the operation likely to be performed.*" "Antitoxines: Injections of serum to counteract a disease. Tetanus is sometimes treated by injections from rabbits rendered incapable of taking the disease."

The definitions alone seem hardly more happy, as a few will readily show, e. g. "Anthracosis: Carbuncular disease (?) *caused by inspiring particles of coal.*" "Argyll-Robertson pupil: Pupil of the eye which does not contract when subjected to light." "Bacteria: Rod-like microbes *supposed to infect the blood with different diseases.* They are unicellular and of fungous growth." Many important words are omitted, and many unimportant quack preparations are mentioned and defined, e. g. Warner's Safe Cure, Vinolia preparations, Beecham's Pills, and other equally unnecessary articles.

It would seem much better to divide "Medical Terms" from "Nursing Treatment," as the two portions of the book have little in common. A good dictionary of terms which nurses will meet with, correctly spelled and concisely, accurately defined, would be a great convenience to nurses. A similar little volume, giving plain, simple descriptions of diseased conditions and furnishing clear directions as to the course to be pursued in emergencies, would also serve an excellent purpose. The combination attempted in the present book cannot be commended. The book is clearly, neatly printed, and the volume is a convenient size to carry in the pocket.

Chorea and Choreiform Affections. By WILLIAM OSLER, M. D. (*H. K. Lewis, London*, 1894.)

In this monograph of 120 pages of letterpress, Prof. Osler has presented to the medical profession a concise treatise upon the various forms of chorea and allied muscular spasms, which constitutes a distinct advance on former publications upon these subjects.

In the opening chapter a very interesting account is given of the earlier historic writings upon the subject, and a few pages further on, the principal more recent contributions to the literature, from England, the European continent, and from America, are outlined. In the next chapter the obscure etiology of the disorder is fully considered. Symptomatology occupies the succeeding two chapters, with a number of abstracts of graphic cases of mild and severe chorea. Chapter IV, "The Heart in Chorea Minor," is one of more than usual interest, and the great frequency of endocarditis in chorea is brought to the attention of the reader with the author's usual care and fidelity of detail. Attention is drawn to the fact that in the majority of cases of endocardial trouble in chorea minor, "the endocarditis is independent of, and not associated with acute arthritis, and that in a considerable proportion of cases, much larger than has hitherto been supposed, the complicating endocarditis lays the foundation of organic heart disease."

Chapter V treats of the anatomy, pathology, and treatment of the disorder. The author appears to be more inclined to consider chorea, in the strict sense of the word, to be of infectious rather than other nature, though truly, as he states, "we are evidently as yet only upon the threshold of the essential cause of either acute rheumatism or chorea. In both disorders there are facts highly suggestive of an infectious nature, but more than this cannot be said at present."

Chapter VI leads to the consideration of choreiform affections. The various forms of habit spasm are very clearly defined, and it is pleasing to the reader to note how clearly Dr. Osler has drawn the distinction between these affections, so many of which are commonly confounded with the chorea of Sydenham. A considerable number of illustrative cases are introduced for the purpose of differentiating the various forms of spasm.

In the final chapter of the book, "Chronic Progressive Chorea" is considered from an historical, etiological, and clinical standpoint, but nothing especially new is developed. The last nine pages of the work are occupied by a careful analysis of seventy-three fatal cases of chorea minor, all but four showing heart lesions mainly in the form of endocarditis.

The monograph, from the introduction to the last page, is well written and very readable; and will probably for a long time occupy a standard place in the literature of one of the most extraordinary maladies that affects the human race. H. J. B.

THE JOHNS HOPKINS HOSPITAL REPORTS,

VOLUME IV, No. 6,

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